

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (currently amended) A method for performing network address translation on data, the method comprising:

receiving a first data having a first source address and a first destination address, wherein the first data is sent by a first node in a first domain to a second node in a second domain, and wherein the first data is received into a first interface associated with the first domain and output from a second interface associated with the second domain, and wherein the first domain differs from the second domain, and wherein the first and second interfaces are virtual interfaces that are each configurably associated with one or more domains;

obtaining routing information for the first data;

if the first source address is a private address and if a binding between the first source address, the first interface, and a first public address is found, translating the first source address into the first public address specified by the found binding prior to sending the first data to the second domain destination;

if the first source address is a private address and if a binding between the first source address, the first interface, and a first public address is not found, translating the first source address into a selected public address and forming and storing a first binding between the first source address, the selected public address, and the first interface, wherein the translation is performed prior to sending the first data to the second domain destination;

if a destination binding between the first destination address, a first private address, and the second interface is found, translating the first destination address into the first private address specified by the destination binding, wherein the

translation of the first destination address is performed prior to sending the first data out the second interface to the second node; and

sending the first data to the second node based on the routing information.

2. (Previously presented) A method as recited in claim 1, further comprising:

receiving a second data having a second source address and a second destination address, wherein the second data is sent by a third node in a third domain to a fourth node in a fourth domain, and wherein the first data is received into a third interface associated with the third domain and output from a fourth interface associated with the fourth domain, and wherein the third domain differs from the first domain but the second source address is the same as the first source address;

obtaining routing information for the second data;

if the second source address is a private address and if a binding between the second source address, the third interface, and a second public address is found, translating the second source address into the second public address specified by the found binding prior to sending the second data from the fourth domain interface;

if the second source address is a private address and if a binding between the second source address, the third interface, and a second public address is not found, translating the second source address into a selected public address and forming and storing a second binding between the second source address, the selected public address, and the third interface, wherein the translation is performed prior to sending the second data from the fourth interface;

if a second destination binding between the second destination address, a second private address, and the fourth interface is found, translating the second

destination address into the second private address specified by the second destination binding, wherein the translation of the second destination address is performed prior to sending the second data out the fourth interface to the fourth node; and

sending the second data to the fourth node based on the routing information.

3. (original) A method as recited in claim 1, wherein the first public address is selected from a pool of available public addresses.

4. (previously presented) A method as recited in claim 1, wherein when the first data has a DNS payload, the method further comprises:

translating the DNS payload of the first data into a second public address, wherein the translation of the first destination address is performed prior to sending the first data to the second node; and

forming a second binding between the DNS payload address, the second public address, and the first interface.

5. (cancelled)

6. (previously presented) A method as recited in claim 1, wherein the first data is a DNS request, the method further comprising:

receiving a second data after the first data, wherein the second data has a second source address, a second destination address, and a DNS payload address, wherein the second data is sent by a third node in the second domain to the first node in the first domain, and wherein the second data is a DNS reply received into the second interface and output from the first interface;

obtaining routing information for the second data;

translating the DNS payload address into a second public address and forming a second binding between the DNS payload address, the second public address, and the second interface, wherein the translation is performed prior to sending the second data out the first interface to the first node; and

sending the second data to the first node based on the routing information obtained for the second data.

7. (original) A method as recited in claim 6, wherein the first binding between the first source address, the first public address, and the first interface is formed by creating a first entry in a first table that includes a first identifier for both the first public address and the first destination address, a destination pointer that references information on how to translate a destination address of a first subsequently received data from the first public address to the first source address, and a source pointer that references a null value.

8. (original) A method as recited in claim 7, wherein the source pointer referencing a null value indicates that the source address of the first subsequently received data does not require translation.

9. (original) A method as recited in claim 8, the method further comprising modifying the first binding, wherein the first binding is modified and the second binding is formed by:

creating a second entry in the first table that includes a second identifier for both the first source address and the second public address, a destination pointer that references information on how to translate a destination address of a second subsequently received data from the second public address into the DNS payload address, and a source pointer that references information on how to translate a source address of the same second subsequently received data from the first source address into the first public address; and

creating a third entry in the first table that includes a third identifier for both the DNS payload address and the first public address, a destination pointer that references information on how to translate a destination address of a third subsequently received data from the first public address into the first source address, and a source pointer that references information on how to translate a source address of the third subsequently received data from the DNS payload address into the second public address.

10. (original) A method as recited in claim 9, wherein the destination and source pointers each reference a pair having a private address of a particular interface and a corresponding public address, wherein the pair provide pre-translation and post-translation addresses for a particular source or destination address.

11. (currently amended) A method as recited in claim 1, ~~further comprising tracking~~ wherein each virtual interface defines which interfaces may communicate with which other interfaces.

12. (currently amended) A method as recited in claim 11, wherein each virtual interface defines which interfaces may communicate with which other interfaces by specifying ~~tracking is accomplished by setting up or dismantling~~ each interface as belonging to one or more groups so that a particular interface is specified as being allowed to communicate with another interface if the particular interface and other interface belong to a same group ~~that each define which interfaces may communicate with each other.~~

13. (original) A method as recited in claim 12, the method further comprising selecting a pool of public addresses for each group.

14. (currently amended) A network address translation (NAT) system operable to perform network address translation on data, the NAT system comprising:

one or more processors;

one or more memory, wherein at least one of the processors and memory are adapted to:

receive a first data having a first source address and a first destination address, wherein the first data is sent by a first node in a first domain to a second node in a second domain, and wherein the first data is received into a first interface associated with the first domain and output from a second interface associated with the second domain, and wherein the first domain differs from the second domain, and wherein the first and second interfaces are virtual interfaces that are each configurably associated with one or more domains;

obtain routing information for the first data;

if the first source address is a private address and if a binding between the first source address, the first interface, and a first public address is found, translate the first source address into the first public address specified by the found binding prior to sending the first data to the second domain destination;

if the first source address is a private address and if a binding between the first source address, the first interface, and a first public address is not found, translate the first source address into a selected public address and form and store a first binding between the first source address, the selected public address, and the first interface, wherein the translation is performed prior to sending the first data to the second domain destination;

if a destination binding between the first destination address, a first private address, and the second interface is found, translate the first destination address into the first private address specified by the destination binding, wherein the translation of the first destination address is performed prior to sending the first data out the second interface to the second node; and

send the first data to the second node based on the routing information.

15. (previously presented) A NAT system as recited in claim 14, wherein when the first data has a DNS payload, one or more memory, wherein at least one of the processors and memory are further adapted to:

translate the DNS payload of the first data into a second public address, wherein the translation of the first destination address is performed prior to sending the first data to the second node; and

form a second binding between the DNS payload address, the second public address, and the first interface.

16. (cancelled)

17. (previously presented) A NAT system as recited in claim 14, wherein the first data is a DNS request, wherein at least one of the processors and memory are further adapted to:

receive a second data after the first data, wherein the second data has a second source address, a second destination address, and a DNS payload address, wherein the second data is sent by a third node in the second domain to the first node in the first domain, and wherein the second data is a DNS reply received into the second interface and output from the first interface;

obtain routing information for the second data;

translate the DNS payload address into a second public address and forming a second binding between the DNS payload address, the second public address, and the second interface, wherein the translation is performed prior to sending the second data out the first interface to the first node; and

send the second data to the first node based on the routing information obtained for the second data.

18. (original) A NAT system as recited in claim 17, wherein the first binding between the first source address, the first public address, and the first interface is formed by creating a first entry in a first table that includes a first identifier for both the first public address and the first destination address, a destination pointer that references information on how to translate a destination address of a first subsequently received data from the first public address to the first source address, and a source pointer that references a null value.

19. (original) A NAT system as recited in claim 18, wherein the source pointer referencing a null value indicates that the source address of the first subsequently received data does not require translation.

20. (original) A NAT system as recited in claim 19, wherein at least one of the processors and memory are further adapted to modify the first binding, wherein the first binding is modified and the second binding is formed by:

creating a second entry in the first table that includes a second identifier for both the first source address and the second public address, a destination pointer that references information on how to translate a destination address of a second subsequently received data from the second public address into the DNS payload address, and a source pointer that references information on how to translate a source address of the same second subsequently received data from the first source address into the first public address; and

creating a third entry in the first table that includes a third identifier for both the DNS payload address and the first public address, a destination pointer that references information on how to translate a destination address of a third subsequently received data from the first public address into the first source address, and a source pointer that references information on how to translate a source address of the third subsequently received data from the DNS payload address into the second public address.

21. (original) A NAT system as recited in claim 20, wherein the destination and source pointers each reference a pair having a private address of a particular interface and a



corresponding public address, wherein the pair provide pre-translation and post-translation addresses for a particular source or destination address.

22. (currently amended) A NAT system as recited in claim 14, wherein ~~at least one of the processors and memory are further adapted to track~~ each virtual interface defines which interfaces may communicate with which other interfaces..

23. (currently amended) A NAT system as recited in claim 22, wherein each virtual interface defines which interfaces may communicate with which other interfaces by specifying ~~tracking is accomplished by setting up or dismantling~~ each interface as belonging to one or more groups so that a particular interface is specified as being allowed to communicate with another interface if the particular interface and other interface belong to a same group ~~that each define which interfaces may communicate with each other.~~

24. (original) A NAT system as recited in claim 23, wherein at least one of the processors and memory are further adapted to select a pool of public addresses for each group.

25. (currently amended) A computer program product for performing network address translation on data, the computer program product comprising:

at least one computer readable medium;

computer program instructions stored within the at least one computer readable product configured to cause a network address translation system to:

receive a first data having a first source address and a first destination

address, wherein the first data is sent by a first node in a first domain to a second node in a second domain, and wherein the first data is received into a first interface associated with the first domain and output from a second interface associated with the second domain, and wherein the first domain differs from the

second domain, and wherein the first and second interfaces are virtual interfaces that are each configurably associated with one or more domains;

obtain routing information for the first data;

if the first source address is a private address and if a binding between the first source address, the first interface, and a first public address is found, translate the first source address into the first public address specified by the found binding prior to sending the first data to the second domain destination;

if the first source address is a private address and if a binding between the first source address, the first interface, and a first public address is not found, translate the first source address into a selected public address and form and store a first binding between the first source address, the selected public address, and the first interface, wherein the translation is performed prior to sending the first data to the second domain destination;

if a destination binding between the first destination address, a first private address, and the second interface is found, translate the first destination address into the first private address specified by the destination binding, wherein the translation of the first destination address is performed prior to sending the first data out the second interface to the second node; and

send the first data to the second node based on the routing information.

26. (previously presented) A computer program product as recited in claim 25, wherein when the first data has a DNS payload, one or more memory, wherein the computer program instructions are further configured to cause the network address translation system to

translate the DNS payload of the first data into a second public address, wherein the translation of the first destination address is performed prior to sending the first data to the second node; and

form a second binding between the DNS payload address, the second public address, and the first interface.

27. (cancelled)

28. (original) A computer program product as recited in claim 25, wherein the first data is a DNS request, wherein the computer program instructions are further configured to cause the network address translation system to

receive a second data after the first data, wherein the second data has a second source address, a second destination address, and a DNS payload address, wherein the second data is sent by a third node in the second domain to the first node in the first domain, and wherein the second data is a DNS reply received into a the second interface and output from the first interface;

obtain routing information for the second data;

translate the DNS payload address into a second public address and forming a second binding between the DNS payload address, the second public address, and the second interface, wherein the translation is performed prior to sending the second data out the first interface to the first node; and

send the second data to the first node based on the routing information obtained for the second data.

29. (original) A computer program product as recited in claim 28, wherein the first binding between the first source address, the first public address, and the first interface is formed by creating a first entry in a first table that includes a first identifier for both the first public address and the first destination address, a destination pointer that references information on how to translate a destination address of a first subsequently received data from the first public address to the first source address, and a source pointer that references a null value.

30. (original) A computer program product as recited in claim 29, wherein the source pointer referencing a null value indicates that the source address of the first subsequently received data does not require translation.

31. (original) A computer program product as recited in claim 30, wherein the computer program instructions are further configured to cause the network address translation system to modify the first binding, wherein the first binding is modified and the second binding is formed by:

creating a second entry in the first table that includes a second identifier for both the first source address and the second public address, a destination pointer that references information on how to translate a destination address of a second subsequently received data from the second public address into the DNS payload address, and a source pointer that references information on how to translate a source address of the same second subsequently received data from the first source address into the first public address; and

creating a third entry in the first table that includes a third identifier for both the DNS payload address and the first public address, a destination pointer that references information on how to translate a destination address of a third subsequently received data from the first public address into the first source address, and a source pointer that references information on how to translate a source address of the third subsequently received data from the DNS payload address into the second public address.

32. (original) A computer program product as recited in claim 31, wherein the destination and source pointers each reference a pair having a private address of a particular interface and a corresponding public address, wherein the pair provide pre-translation and post-translation addresses for a particular source or destination address.

33. (currently amended) A computer program product as recited in claim 25, wherein ~~the computer program instructions are further configured to cause the network address~~

~~translation system to track~~ each virtual interface defines which interfaces may communicate with which other interfaces.

34. (currently amended) A computer program product as recited in claim 33, wherein each virtual interface defines which interfaces may communicate with which other interfaces by specifying ~~tracking is accomplished by setting up or dismantling~~ each interface as belonging to one or more groups so that a particular interface is specified as being allowed to communicate with another interface if the particular interface and other interface belong to a same group ~~that each define which interfaces may communicate with each other.~~

35. (original) A computer program product as recited in claim 34, wherein the computer program instructions are further configured to cause the network address translation system to select a pool of public addresses for each group.

36. (currently amended) An apparatus for performing network address translation on data, the apparatus comprising:

means for receiving a first data having a first source address and a first destination address, wherein the first data is sent by a first node in a first domain to a second node in a second domain, and wherein the first data is received into a first interface associated with the first domain and output from a second interface associated with the second domain, and wherein the first domain differs from the second domain, and wherein the first and second interfaces are virtual interfaces that are each configurably associated with one or more domains;

means for obtaining routing information for the first data;

means for, if the first source address is a private address and if a binding between the first source address, the first interface, and a first public address is

found, translating the first source address into the first public address specified by the found binding prior to sending the first data to the second domain destination;

means for translating the first source address into a selected public address and forming a first binding between the first source address, the selected public address, and the first interface if the first source address is a private address and if a binding between the first source address, the first interface, and a first public address is not found, wherein the translation is performed prior to sending the first data to the second domain destination;

means for translating the first destination address into the first private address specified by the destination binding if a destination binding between the first destination address, a first private address, and the second interface is found, wherein the translation of the first destination address is performed prior to sending the first data out the second interface to the second node; and

means for sending the first data to the second node based on the routing information.

37. (previously presented) An apparatus as recited in claim 36, wherein the first data is a DNS request, the apparatus further comprising:

means for receiving a second data after the first data, wherein the second data has a second source address, a second destination address, and a DNS payload address, wherein the second data is sent by a third node in the second domain to the first node in the first domain, and wherein the second data is a DNS reply received into the second interface and output from the first interface;

means for obtaining routing information for the second data;

means for translating the DNS payload address into a second public address and forming a second binding between the DNS payload address, the

second public address, and the second interface, wherein the translation is performed prior to sending the second data out the first interface to the first node; and

means for sending the second data to the first node based on the routing information obtained for the second data.

38. (previously presented) A NAT system as recited in claim 14, wherein at least one of the processors and memory are further adapted to:

receive a second data having a second source address and a second destination address, wherein the second data is sent by a third node in a third domain to a fourth node in a fourth domain, and wherein the first data is received into a third interface associated with the third domain and output from a fourth interface associated with the fourth domain, and wherein the third domain differs from the first domain but the second source address is the same as the first source address;

obtain routing information for the second data;

if the second source address is a private address and if a binding between the second source address, the third interface, and a second public address is found, translate the second source address into the second public address specified by the found binding prior to sending the second data from the fourth domain interface;

if the second source address is a private address and if a binding between the second source address, the third interface, and a second public address is not found, translate the second source address into a selected public address and form and store a second binding between the second source address, the selected public

address, and the third interface, wherein the translation is performed prior to sending the second data from the fourth interface;

if a second destination binding between the second destination address, a second private address, and the fourth interface is found, translate the second destination address into the second private address specified by the second destination binding, wherein the translation of the second destination address is performed prior to sending the second data out the fourth interface to the fourth node; and

send the second data to the fourth node based on the routing information.

39. (previously presented) A computer program product as recited in claim 25, the computer program instructions stored within the at least one computer readable product further configured to cause the network address translation system to:

receive a second data having a second source address and a second destination address, wherein the second data is sent by a third node in a third domain to a fourth node in a fourth domain, and wherein the first data is received into a third interface associated with the third domain and output from a fourth interface associated with the fourth domain, and wherein the third domain differs from the first domain but the second source address is the same as the first source address;

obtain routing information for the second data;

if the second source address is a private address and if a binding between the second source address, the third interface, and a second public address is found, translate the second source address into the second public address specified



by the found binding prior to sending the second data from the fourth domain interface;

if the second source address is a private address and if a binding between the second source address, the third interface, and a second public address is not found, translate the second source address into a selected public address and form and store a second binding between the second source address, the selected public address, and the third interface, wherein the translation is performed prior to sending the second data from the fourth interface;

if a second destination binding between the second destination address, a second private address, and the fourth interface is found, translate the second destination address into the second private address specified by the second destination binding, wherein the translation of the second destination address is performed prior to sending the second data out the fourth interface to the fourth node; and

send the second data to the fourth node based on the routing information.